97-84009-29

Carroll, James Joseph

Visual requirements of transportation employees

Chicago

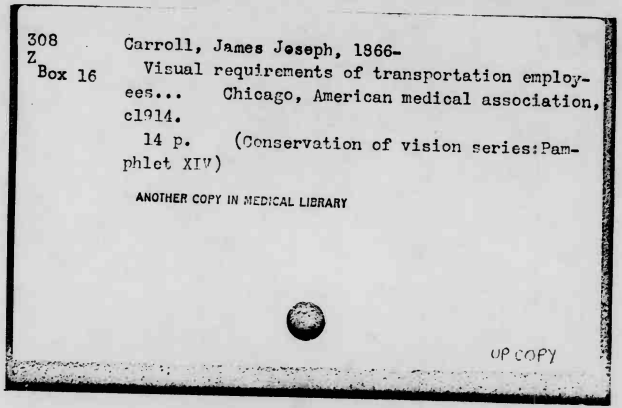
c1914

97-84009-29
MASTER NEGATIVE #

COLUMBIA UNIVERSITY LIBRARIES
PRESERVATION DIVISION

# BIBLIOGRAPHIC MICROFORM TARGET

ORIGINAL MATERIAL AS FILMED - EXISTING BIBLIOGRAPHIC RECORD



308
Z
Box 16

Carroll, James Joseph, 1866-
Visual requirements of transportation employees... Chicago, American medical association, c1914.
14 p. (Conservation of vision series: Pamphlet XIV)

ANOTHER COPY IN MEDICAL LIBRARY

UP COPY

RESTRICTIONS ON USE: Reproductions may not be made without permission from Columbia University Libraries.

## TECHNICAL MICROFORM DATA

FILM SIZE: 35mm REDUCTION RATIO: 11:1 IMAGE PLACEMENT: IA (IIA) IB IIB

DATE FILMED: 1-17-97 INITIALS: RR

TRACKING # : 20252

FILMED BY PRESERVATION RESOURCES, BETHLEHEM, PA.

Gift.
Legis. Drafting Dept.
SEP 30 1918

308
Z
B07/6

# Visual Requirements of Transportation Employees

J. J. CARROLL, M.D.
BALTIMORE, MD.

**CONSERVATION OF VISION SERIES**
**PAMPHLET XIV**

Prepared by the Committee on Conservation of Vision

Issued by the Council on Health and Public Instruction of the American Medical Association

"In the health of the people lies the wealth of the nation."
—*Gladstone.*

COPYRIGHT, 1914
AMERICAN MEDICAL ASSOCIATION
FIVE HUNDRED AND THIRTY-FIVE NORTH DEARBORN STREET
CHICAGO

## Conservation of Vision Pamphlets

The following pamphlets, prepared by the Committee on Conservation of Vision and issued by the Council on Health and Public Instruction, form a series of popular articles cn the care and preservation of good eyesight.

PAMPHLET I.—Schoolchildren's Eyes, by Dr. Frank Allport, Chicago.

PAMPHLET II.—Industrial and Household Accidents to the Eye, by Dr. Harold Gifford, Omaha.

PAMPHLET III.—Wearing Glasses, by Dr. W. B. Lancaster, Boston.

PAMPHLET IV.—The Relation of Illumination to Visual Efficiency, by Dr. Ellice M. Alger, New York.

PAMPHLET V.—Trachoma in Eastern Kentucky, by Dr. J. A. Stucky, Lexington, Ky.

PAMPHLET VI.—Auto-Intoxication and the Eye by Dr. H. D. Bruns, New Orleans.

PAMPHLET VII.—Eye-Strain, by Dr. Hiram Woods, Baltimore.

PAMPHLET VIII.—Lenses and Refraction, by Dr. Frank Allport, Chicago.

PAMPHLET IX.—The Eye and Its Functions, by Dr. Frank Allport, Chicago.

PAMPHLET X.—Care of the Eyes, by Dr. Frank Allport, Chicago.

PAMPHLET XI.—Infant Blindness, or Ophthalmia Neonatorum, by Dr. F. Park Lewis, Buffalo, N. Y.

PAMPHLET XII.—Ordinary Eye Diseases, by Dr. L. W. Dean, Iowa City, Iowa.

PAMPHLET XIII.—Usual and Unusual Eye Accidents, by Dr. E. C. Ellett, Memphis, Tenn.

PAMPHLET XIV.—The Eyes of Transportation Employees, by Dr. J. J. Carroll, Baltimore.

PAMPHLET XV.—Ocular Hygiene in Schools, by Dr. S. D. Risley, Philadelphia.

PAMPHLET XVI.—Whisky, Tobacco and Drugs and the Eye, by Dr. Edward Jackson, Denver.

PAMPHLET XVII.—The Oculist and the Optician, by Dr. Melville Black, Denver. (In preparation.)

PAMPHLET XVIII.—Preparation for Blindness, by Dr. F. Park Lewis, Buffalo.

PAMPHLET XIX.—What to Do for Blind Children, by Dr. F. Park Lewis, Buffalo.

PAMPHLET XX.—Blindness from Wood Alcohol, by Dr. Casey Wood, Chicago.

This series is now ready; others will be added later.

**Prices**

| | | | |
|---|---|---|---|
| Single pamphlets | $0.05 | 10 Copies | $0.45 |
| Series of 17 pamphlets | .70 | 25 Copies | 1.00 |
| 5 Copies | .25 | 50 Copies | 1.80 |
| *All sent post-paid.* | | 100 Copies | 3.50 |
| | | *Assorted as desired.* | |

**AMERICAN MEDICAL ASSOCIATION**

**535 North Dearborn Street, - - Chicago, Illinois**


16 Nov. 1915. 145

# VISUAL REQUIREMENTS OF TRANSPORTATATION EMPLOYEES


J. J. CARROLL

BALTIMORE


Transportation companies may be said to comprise chiefly steam railroads and steamships. The importance of these common carriers may be estimated in a way by the service which they render the people of the country. Some idea of this service may be formed by referring to the number of passengers and the amount of freight carried each year by the railroads alone in the United States. According to the annual report of the Interstate Commerce Commission, 994,158,591 passengers, and 1,818,232,193 tons of freight were carried on our railroads during the twelve months immediately preceding June 30, 1912. These millions of passengers and nearly two billion tons of freight must be conveyed in a reasonable time and with comparative safety. After acknowledging our indebtedness to the men who supply the great sums of money to make this possible, and after giving due praise to the officials who direct these companies in accomplishing such stupendous work, we must not forget the men who bear the real burden of the day, the employees, who, like the buried stones of the monument, are not conspicuous to the public eye, but are nevertheless the real foundation of these companies.

In studying the development of our transportation systems, no small importance must be placed on the rapid growth of the country itself. The two have gone hand in hand. The growth of the one necessarily brought a measure of success to the other. In addition, however, to the great help the railroads and navigation companies received from the development of the country, they undoubtedly owe much of their success to agencies and influences entirely within themselves. Not the least of these is the spirit of hustle and enterprise which characterizes the management of American railroads par-

ticularly. Of the several ways in which this native spirit is manifested, one is by a constant search for something and ready acceptance of anything which brings greater efficiency and better results. The freight engine which used to draw thirty to forty cars must give way to one capable of hauling from seventy to one hundred cars. The passengers engine which was built for a speed of forty to fifty miles an hour must be put aside for one capable of making sixty to seventy miles an hour. In other words, both passenger and freight trains must increase their efficiency. Something similar is expected even of the material which goes into railroad construction. Chemical and physical tests are now made of nearly all the material intended for use on railroads. This is done for the purpose of detecting weak and defective material, and of selecting only the strong and perfect.

The same careful method of choosing the fittest in the selection of employees has been pursued for some time past by most railroad and steamship companies. It is not hard to see that the healthy, able-bodied employee will give better service than the weak and delicate. The health of the worker is truly a very important factor in the problem of industrial efficiency, and it should be duly considered by the employer if for no other reason than that of economy. With transportation companies especially, the qualification of good physical health should be one of paramount importance. Under the physical requirements, one of particular import should be that of good vision. Every man selected to fill a position which is in any way connected with the movement of trains or the guiding of vessels should have normal sight. This is demanded not only from an economic point of view, but even more strongly on account of the question of safety.

According to the Accident Bulletin of the Interstate Commerce Commission for July, August and September, 1907, there were 1,339 persons killed and 21,724 injured during these three months on American railroads. Besides this sacrifice of life, the suffering of the injured and the permanent disability of many which resulted from these accidents, there was a damage to railroad property of $3,605,696. Other statistics might be cited, showing an altogether unwarranted destruction of



human lives and property when entrusted to the care of transportation companies.

The seriousness of this problem has been recognized for some time, both by the managers of the companies and by the people at large, but it has only been within recent years that extraordinary efforts have been made to effect its solution. It is idle to suppose that the owners of railroads are callous in the matter of safety to travelers. If an accident happens on any of our roads, it almost always means that railroad men are killed or injured, and it is always railroad property which is damaged. Self-interest, if no other reason, would lead railroads to prevent accidents. Millions have been spent on road bed, rolling stock, steel cars, etc., for the sole purpose of reducing the number and fatality of accidents.

It was this same spirit on the part of railroads which gave rise to the "Safety First" movement about five or six years ago. This has extended so rapidly throughout the country that it bids fair to be able to show soon a big reduction in the number of accidents, by instructing the 1,699,218 railroad employees how to avoid them.

On the other hand, public sympathy has been justly aroused in recent years by the number and character of railroad casualties, and this interest on the part of the people has found expression in an act of Congress, approved May 6, 1910, "Requiring common carriers engaged in interstate and foreign commerce to make full reports of all accidents to the Interstate Commerce Commission, and authorizing investigation thereof by said commission." With the railroads making every effort possible to prevent accidents, with the critical eye of the public watching for failures, and a commission with federal authority in readiness to investigate all accidents, it would seem that the recent campaign for the prevention of accidents has found favorable conditions.

It is not possible to have railroads without disasters, but they should be fewer than at present. While bad roadways, defective equipment, short flagging, excessive speed, failure to observe signals, failure to obey orders, slippery rails, open switches, failure of brakes, are the usual causes of railroad accidents, physical indisposition on the part of the men, overwork, loss of sleep, sickness at home, family troubles, financial difficulties and the use of intoxicants are frequently contributing factors, diverting the attention of the employee from his duty at

a critical moment. Individuals against whom most accidents are charged are road inspectors, train dispatchers, telegraph operators, conductors, enginemen, firemen, brakemen, flagmen and switch tenders. To all of these, the matter of seeing well is of first importance, and it is not strange that railroads should require of them normal vision.

What is good sight as far as it concerns railroad employees who are in any way connected with train service? To speak rather roughly, good sight means the ability to see clearly large objects in the distance, as well as fine print at about twelve inches, and to distinguish readily between colors. The former is usually called acuteness of vision, the latter, color sense. Men in train service must have both. By acuteness of vision, an engineman in his cab is able to see clearly, in favorable weather, a signal 4,000 feet ahead. The same individual is, by virtue of his color sense, able at night to distinguish between the red light of danger, the green light of caution, and the white of clear way. The ability to see at a long distance is a faculty of persons having normal sight. It is also possible in persons who are slightly far-sighted. It is absent in those who are near-sighted, to whom distant objects appear blurred or are even quite invisible. Near-sighted persons, therefore, are excluded from train service, because they would be a constant menace to travel. Moreover, men with diseases of the eye which seriously affect the vision are debarred for the same reason.

A train composed of a locomotive and eight cars, weighing 532.2 tons, can be stopped with modern air brakes from a speed of 80 miles an hour within a distance of about 2,403 feet, and from a speed of 70 miles an hour within a distance of about 1,790 feet, and from a speed of 60 miles an hour within a distance of about 1,000 feet (Westinghouse Air-Brake Co.). Bringing a fast moving train to a stop in less than a fifth of a mile, as in the last instance, is an achievement capable of accomplishment only under favorable conditions. Tracks are frequently slippery and brakes do not always respond readily to the efforts of the engineman. Consequently, several hundred feet should be added to the above distances for emergency and safety. This would allow about twenty-six hundred feet, or approximately half a mile for the stopping of the fastest trains. Obviously, a



man who cannot see either the ordinary railroad signals or an obstructed track at this distance, is not fit to be trusted with the running of trains. Seeing targets and semaphores is an easy task to an engineman with good eyes. He soon knows by experience where they are located, and looks for them almost automatically. It is different with obstructions on the track. They may occur anywhere, and the cautious engineman is ever on the lookout for them. They lie much lower than the ordinary signals and are more difficult to see. This difficulty is at times greatly increased by bad weather, especially rain, snow and fog. The number of accidents clearly ascribable to unfavorable atmospheric conditions bears testimony to this. Night service brings its own special difficulties. The signal lights in the semaphores should be seen two miles in clear weather if the lamps in the signals are clean. The low lights, as hand signals, etc., are detected about half a mile. In bad weather, especially in a dense mist or thick fog, the reading of signals is quite impossible at the usual distances. Even in clear weather, it occasionally happens, by a peculiar reflection, that false lights are seen where in reality there are no lights at all.

There is another condition effecting enginemen of double-track roads which makes distinct seeing for the time very difficult. This happens when he is trying to see hand signals or even block signals while facing the glare of an approaching engine equipped with an electric or acetylene headlight. It has been pretty well proven that while an engineman can see hand signals at about 2,552 feet if there is no opposing headlight, he is able to see the same signals only at about 1,587 feet if there is an opposing electric headlight. This is important, because, should he be running his train faster than 60 miles an hour when confronted with such a light, he would probably be unable to stop his train before reaching the signal.

Eyesight, together with the conditions under which it has to be used in railroad service, has been carefully studied by competent authorities, and standards of vision have been established for the various classes of employees. As an example I append the visual requirements of one of the large railroad companies in the east. The fraction 20/20 on the form means normal vision.

Besides good acuteness of vision, employees in train service must have normal color sense. They must be

| Occupation | To Enter Service | To Be Promoted | Re-examination |
|---|---|---|---|
| Engineers and Firemen—Road service. | 20/20 in each eye, without glasses. Must have normal perception. | 20/20 in one eye and not less than 20/30 in the other, without glasses. | Not less than 20/40 in one eye and 20/50 in the other, without glasses. |
| Engineers and Firemen—Yard Service. | ..... | 20/20 in one eye and not less than 20/30 in the other, without glasses. | Not less than 20/40 in one eye and 20/50 in the other, with or without glasses. |
| Passenger conductors, passenger brakemen, passenger baggage masters, yard conductors, yard brakemen, road conductors, freight brakemen, flagmen. | 20/20 in one eye and not less than 20/40 in the other, without glasses. | Not less than 20/30 in one eye and 20/40 in the other, without glasses. | Not less than 20/40 in one eye and 20/50 in the other, with or without glasses. |
| Yard masters, telegraph operators, towermen, levermen (if operators), section foremen, assistant section foremen, switch tenders, leading laborers, signal inspectors, signal foremen, leadermen, levermen, hostlers, hostlers' helpers. | Not less than 20/40 in the other eye and 20/40 in the other, with or without glasses, provided vision in each eye without glasses is not less than 20/50. | Not less than 20/40, both eyes being open and used together, with or without glasses. | Not less than 20/50, both eyes being open and used together, with or without glasses. |
| Car inspectors, engine inspectors. | Not less than 20/30 in one eye and 20/40 in the other, without glasses. Range of vision must not be less than 8 to 9 inches in either eye, without glasses. | ..... | Not less than 20/40 in one eye and 20/50 in the other, with or without glasses. If range of vision falls below 15 to 20 inches bifocal glasses must be worn to make correction. |
| Train masters, assistant train masters, crossing watchmen, bridge carpenters. | Not less than 20/40 in one eye and 20/50 in the other, with or without glasses, provided vision in each eye, without glasses, is not less than 20/50. | ..... | Not less than 20/50, both eyes open and used together, with or without glasses. |



able to detect quickly and unmistakably the different colored lights used in signalling. A person who is incapable of detecting the difference between colors is said to be color-blind. The number of men with this defect is perhaps greater than is commonly supposed. It is estimated that one male in every twenty is in a measure defective in the perception of colors. The defect is usually congenital, though it may accompany diseases of the optic nerve and retina. It has been known to go through several generations of a family.

What is color blindness? It is inability of the eyes to distinguish between colors. It is not a blindness in the ordinary sense of the term for any special color, but a lack of power to distinguish one color from another. Green or red, for instance, may produce a sensation of color in a person who is color-blind, but the sensation will be practically the same whether he is looking at a green object or a red one. Hence the confusion in distinguishing between the two. It is very rare to find a person who is totally color-blind. To such a one the world appears gray. The commonest color defect is blindness for red. It is not to be understood that a person with this defect is unable to perceive red objects at all. It is simply that the sensation which he gets from looking at a red object, is similar to that which he gets when looking at a green one. Though these sensations are similar in his perception of them, they are not exactly the same. They are distinguishable by their difference in brilliancy or luminosity. It is possible for a man who is red-blind to tell red from green. He may do this, not by seeing the difference in color, but by detecting the difference in brilliancy. This disparity between the color sensation of a man who is red-blind and one who has normal color sense frequently remains unknown to the color-blind. During the early years of life, certain objects are pointed out to him by his companions as red, others as green, and he learns to distinguish the difference between the two. To give a common illustration—he is told that the leaves of the cherry tree are green and the cherries red. He notices a difference between the two. Although it is a difference of brilliancy and not of color, he imagines he sees just as his companions see. In this way a person color-blind from birth may be totally unaware of his color defect and carry it undetected throughout life.

If a normal-sighted person views the colors in the spectrum, he will distinguish six colors. If a person with defective color sense looks at the spectrum, he sees either four, three, two, one color or even no color at all. Most color-blind persons can see two or three colors. To those seeing but two colors in the spectrum, all the colors on the red side seem confused, red, orange, yellow and half of the green being seen as one color, while the rest of the green, the blue and the violet appear as the other color. There may be shortening of varying degree at either the red or the violet end of the spectrum. Such persons may be regarded as having two colors, red and violet, and are said to be dichromic. Persons who can see three distinct colors in the spectrum, as red, green and violet, are called trichromic, and their chief trouble is in recognizing yellow and blue.

As a rule, color-blind persons find special difficulty with faint and dim colors. It may be possible for them to recognize colors if they are in a good light and close to the eyes, while they will fail utterly if the colors are placed at a distance. Another peculiarity of the color-blind is that they usually have a bad memory for colors, and they fatigue more easily with colors than the normal-sighted.

It is not hard to appreciate the importance of excluding from the train service of railroads men who have not good color perception. Even if the vital question of safety could possibly be eliminated, the constant mistakes of color-blind enginemen or flagmen would give rise to endless confusion and would make modern travel practically impossible. Of the color-defectives that may be regarded as dangerous are (1) such as are unable to distinguish between red, green and white lights at a distance of one mile; (2) such as are unable to see more than three colors in the spectrum; (3) those who, while being able to see more than three colors in the spectrum, have the red end so materially shortened as to be incompatible with recognizing a red light at a distance of two miles.

To ascertain whether an applicant for employment is color-blind or not, he is usually subjected to two tests. one consisting of the matching of colored worsteds, and the other of distinguishing between colored lights in a lantern. The former is called the Holmgren test. While it is about the best in use at present, it is generally conceded to be far from being perfect. There may be a few who will be turned down by this test who are not color-blind, but there is a larger number of men who may pass who are really color-blind. Evidently a supplementary test is needed, and we have such a one in the Williams lantern. It may be of interest to know how the two tests are made.



This should be made only by daylight, and never when it is very dark or foggy. A properly assorted set of wools consists of three large skeins, of a light pure green, rose pink and red, respectively, and of 150 small skeins of the following colors: red, orange, yellow, yellow green, pure green, blue green, violet, purple, pink, brown and gray. In addition, there are several shades of each color and a number of gradations of each tint from the deepest to the lightest.

Part 1.—After the entire set of wools has been spread out on a table before the candidate, the examiner places the large green skein at a distance of about two feet from the other colors, and asks the candidate to select from the heap of colors all that look to him like this test skein, and place them beside it. No names should be mentioned in connection with any color during the test, which should be based only on a comparison of colors. The candidate should be made to understand that he is not expected to find an exact match for the test skein, but that he is to choose all the colors that appear to him of the same general color as the test skein, both those that are lighter and those that are darker in shade. A person with normal color-sense will pick out the lighter and darker shades of green rapidly and without hesitation. He may, perhaps, include in his choice a few green skeins inclining to yellow or blue; but this is no evidence of color-blindness, but rather of a lack of practice with colors. The completely color-blind, whether to red or green, will select, with or without greens, some confusion colors—grays, drabs, fawns, pinks or yellows. The completely color-blind, or those with a feeble chromatic sense, will add to the selection of greens one or more light fawns or grays. When confusion colors have been selected, we know that the candidate is either completely or incompletely color-blind. In order to determine its nature and degree, we employ a second test.

Part II.—Return all the colors to the heap and mix them together. Place the large rose skein apart from the rest, and have the candidate select as before, all the colors that look to him like this skein. The color-blind will always select deeper colors, i. e., either the light or deep shades of blue or violet. The completely red-blind will select blue or violet, either with or without purple. The complete green-blind will choose green or gray, either with or without purple.

Part III.—This test is merely supplementary to the two preceding and consists in separating the red skein from the rest of the wools. The red-blind will select, besides the red, green and brown shades darker than the red. The green-blind will select green and brown shades lighter than the red. Only persons with marked color-blindness manifest their defect with this test.

Lantern Test.—One of the principal advantages of this test lies in the simultaneous comparison of colored lights which it gives. One, two or three colored lights can be shown at one time, and with varying colored areas and intensity of light. In actual train service several colors are often shown on one signal or bridge, and with this lantern many combinations can be shown; for instance, three reds of different shades, two greens and a red, a red, a green and a yellow, two reds and a white, etc. The lantern is placed in a darkened room 20 feet from the person to be examined, the side of the lantern carrying the disk of colored glasses facing directly toward the examinee. The shutters are arranged so that three lights are shown through the largest openings. The disk is turned slowly, allowing all the different combinations of color to come in view. The person examined calls aloud the names of the colors as shown, designating thus: "Left green, middle red, right red," etc. As the examination proceeds the examiner notes the name given to the color shown. After all the colors have been shown through the largest openings, the shutter is moved so that the colors are seen through one opening only of the smallest size. Calling a green blue or vice versa, calling a yellow red, or with the smallest opening failing to see the color of cobalt blue, which transmits less light than some of the others, will not be considered as serious mistakes, but calling a red light green or a green light red shows that the color perception is too



defective to be considered safe in a position requiring the prompt discrimination of signal lights. Atmospheric conditions of smoke, rain and fog are simulated by using smoke glass of different shades, ground glass and ribbed glass.

Classification Test.—Another test has been introduced in recent years by Dr. Edridge-Green, namely the classification test. This consists of a number of colored beads in which every variety of confusion color is well represented, and a box with four compartments into which the beads can be dropped. The important feature is that the observer cannot see the bead after it has once been dropped into the selected compartment labeled red, yellow, green or blue. The person to be examined is asked to select from the beads all those that are red, keeping as nearly as possible to the exact hue, but to select those that are lighter or darker of the same color, and to drop them one by one into the compartment labeled red. The process is repeated with the other colors. Since the examinee has no chance to compare the colors directly, he must select them according to the name which he gives to the color. The normal-sighted will make the selection with the greatest ease, the color-blind will make their usual errors.

The most scientific examination of the color-blind is probably by means of the spectroscope. By this it is seen whether one sees the spectrum shortened at one of its two ends, and what colors he can distinguish in it. Isolated portions of the spectrum are shown him, and he is supposed to tell both by naming the colors, and by comparing them with specimens of other colors how the different parts of the spectrum look to him.

These tedious tests may seem to the general public rather exacting. When one considers, however, that not only the efficiency of railroad employees, but the safety of the travelling public depend in a great measure on good acuity of vision and normal color sense, he will at once realize the wisdom of careful examinations by competent examiners. Such examinations must be made not only when the men enter the service, but they must be repeated every two, three or five years, while they remain in it. This necessitates a good deal of work on the part of the medical corps of the railroads, and some loss of time on the part of the men, but experience has clearly shown the value of re-examinations.

EMPLOYEES OF NAVIGATION COMPANIES

What has been said concerning the importance of normal sight in those railroad employees who are engaged in the moving of trains, may be applied with equal force to men engaged in the directing of vessels, whether propelled by steam, gas, naptha, electricity or what not. Travel by water either for business or pleasure is rapidly increasing. The people clamor for quick voyages, and navigation companies are constantly increasing the size and speed of vessels. In former years passengers were content with fifteen knots an hour for ocean travel. Now they are hardlv satisfied with twenty. Vessels nowadays must be manned both in regard to officers and crew with wide-awake, quick-acting and far-seeing men. This applies not only to the large liners steaming between the United States and European countries, but also to vessels engaged in domestic or coastwise trade. The standards for visual requirements for navigation have been rather too low in the past. There are signs of an awakening of the public to this fact, and the law-makers are already being asked to give their attention to the matter of revising the old standards. Legislative bodies, whether state or national, are quite within their rights when they prescribe certain restrictions for the safety of the traveling public. It should, however, be borne in mind that if the restrictions are too exacting, the number enlisting for sea duty will be very much curtailed, and the number of eligible men may fall too low to meet the demand. There are a certain number of men who seem to have a natural inclination to follow the sea. If they should be debarred from a life on the water, they would probably find it very hard to adapt themselves to a life on land. Then, too, if a man who has spent a number of years at sea, is turned down because he cannot meet stricter visual requirements, he may be utterly incapable, at his stage of life, to turn his mind to any kind of work at all on land. Stricter requirements concerning good vision in seafaring men will necessarily work some hardships on the individual, but their enforcement will certainly not be without its effect in increasing efficiency of both officers and crew, and bringing about safer navigation.

Who may be regarded as having sufficiently good sight to be entrusted with the duties of navigation? This



includes not only the officers on the bridge or in the pilot house, but also the seamen on the watch. Speaking in a general way, it may be said if a man is not able to distinguish clearly and without hesitation the difference between the masthead light, the starboard light and the port light, he is surely not fit to be trusted with the responsibilities of navigation. If he is unable to distinguish the sidelights at a distance of two miles, he should be excluded. Again, if a man in clear daylight is unable to sight a vessel at sea as soon as she appears on the horizon, he is not fit for ocean navigation. Ability to see objects at a long distance is indispensable for seamen. Hence, near-sighted persons are not fit for sea duty. It goes without saying that men with eyes seriously impaired by disease are likewise unfit. The normal-sighted and those only slightly far-sighted are alone capable of meeting the requirements. The question often arises whether it is advisable to allow seamen to wear glasses. Though the defective vision of such persons may be entirely corrected by glasses, still it is decidedly inadvisable to allow either officers on the bridge or seamen in the lookout to wear glasses. These men are almost constantly exposed to rain, snow, mist or the spray from the sea, and moisture on glasses renders them for the time useless for clear and distinct vision. Glasses also diminish luminosity to an appreciable extent, and this renders their use unsuitable for night navigation.

The tests which have been mentioned already in regard to railroad employees, may be used with slight modification in the case of seamen. As for standards, I believe those which were recommended to the Department of Commerce and Labor by the Committee on Visual Standards for Pilots of the American Medical Association are good and practical, and should be extended to all branches of navigation. They are as follows:

1. Normal color-sense. Any imperfection disqualifies.

2. A candidate must have at least 20/40 uncorrected vision in one eye and 20/70 in the other, and corrected vision must equal 20/20 in one eye and at least 20/40 in the other.

3. All pilots under 50 years of age must submit to re-examination every five years; those over 50 years every two years.

4. In the event that the examiner has reason to suppose that visual acuity or color-sense may rapidly deteriorate, he shall issue a license only for as long a time as he considers the visual standards will be maintained, the candidate being ordered to report for re-examination at the end of that period..

By order of the Secretary of the Department of Commerce and Labor, at that time, these standards went into force July 1, 1911. It soon became evident, however, that there was considerable dissatisfaction among pilots and others affected by the new standards on account of the difficulty of some to pass the tests required for the renewal of license. The officers rejected by the new standards appealed to Washington to have them set aside, and in February, 1913, the Secretary of the Department of Commerce and Labor decided that although the standards at the examination for the original license would still be maintained, the tests for visual acuity at the time of the renewal of license would be dispensed with, though the candidates would be tested for color at that time, and a normal color-sense required. According to this ruling, a marine officer having once qualified at the original test, may continue his duties even after his acuteness of vision has become seriously impaired.

It is to be hoped that the safety movement, now so much in evidence, and the appreciation of the public to the dangers of travel both by land and sea, will bring about higher and uniform standards of vision not only for employees of railroads, but also for those of navigation companies.

## SCIENTIFIC RESEARCH SERIES

PAMPHLET I.—Vaccination and Its Relation to Animal Experimentation, by Dr. J. F. Schamberg, Philadelphia. 56 pp. Illustrated.

PAMPHLET II.—Animal Experimentation and Tuberculosis, by Dr. E. L. Trudeau, Saranac Lake, N. Y. 16 pages.

PAMPHLET III.—The Rôle of Animal Experimentation in the Diagnosis of Disease, by Dr. M. J. Rosenau, Washington, D. C. 8 pages.

PAMPHLET IV.—Animal Experimentation and Cancer, by Dr. James Ewing, New York. 12 pages.

PAMPHLET V.—The Ethics of Animal Experimentation, by Prof. J. R. Angell, Chicago. 8 pages.

PAMPHLET VI.—Animal Experimentation: The Protection It Affords to Animals Themselves and Its Value to the Live-Stock Industry, by Dr. V. A. Moore, Ithaca, N. Y. 20 pages.

PAMPHLET VII.—Rabies and Its Relation to Animal Experimentation, by Dr. L. Frothingham, Boston. 16 pages.

PAMPHLET VIII.—Importance of Animal Experimentation in the Development of Knowledge of Dysentery, Cholera and Typhoid Fever, by Dr. M. W. Richardson, Boston. 8 pages.

PAMPHLET IX.—Fruits of Medical Research with Aid of Anesthesia and Asepticism, by Dr. Charles W. Eliot, Boston. 16 pages.

PAMPHLET X.—Animal Experimentation in Relation to Our Knowledge of Secretions, Especially Internal Secretions, by Dr. S. J. Meltzer, New York. 32 pages.

PAMPHLET XI.—Animal Experimentation and Protozoan Tropical Diseases, by Dr. Harry T. Marshall, Charlottesville, Va. 20 pages.

PAMPHLET XII.—Modern Antiseptic Surgery and the Rôle of Experiment in Its Discovery and Development, by Dr. W. W. Keen, Philadelphia. 20 pages.

PAMPHLET XIII.—Animal Experimentation in Relation to Practical Medical Knowledge of the Circulation, by Dr. Joseph Erlanger, Madison, Wis. 40 pages.

PAMPHLET XIV.—What Vivisection Has Done for Humanity, by Dr. W. W. Keen, Philadelphia. 16 pages.

PAMPHLET XV.—The Relation of Animal Experimentation to Our Knowledge of Plague, by George W. McCoy, San Francisco. 12 pages.

PAMPHLET XVI.—Medical Control of Vivisection, by Dr. Walter B. Cannon, Boston, 8 pages.

PAMPHLET XVII.—Immunology: A Medical Science Developed Through Animal Experimentation, by Dr. Frederick P. Gay, Berkeley, Cal. 20 pages.

PAMPHLET XVIII.—Obstetrics and Animal Experimentation, by Dr. J. Whitridge Williams, Baltimore. 36 pages.

PAMPHLET XIX.—Some Characteristics of Antivivisection Literature, by Dr. Walter B. Cannon, Boston. 16 pages.

PAMPHLET XX.—The Value of Animal Experimentation as Illustrated by Recent Advances in the Study of Syphilis, by Dr. J. W. Churchman, Baltimore. 24 pages.

PAMPHLET XXI.—Animal Experimentation and Epidemic Cerebrospinal Meningitis, by Dr. C. H. Dunn, Boston. 28 pages.

PAMPHLET XXII.—Animal Experimentation and Diphtheria, by Dr. W. H. Park, New York. 19 pages.

PAMPHLET XXIII.—Animal Experimentation and Its Benefits to Mankind, by Dr. Walter B. Cannon, Boston. 24 pages.

PAMPHLET XXIV.—The Influence of Antivivisection on Character, by Dr. W. W. Keen, Philadelphia. 43 pages.

PAMPHLET XXV.—Antivivisection Legislation: Its History, Aims and Menace. By Dr. W. B. Cannon, Boston. 11 pages.

PAMPHLET XXVI.—The Charge of "Human Vivisection" as Presented in Antivivisection Literature, by Richard M. Pearce, M.D., Philadelphia. 32 pages.

PRICES

| Pamphlets I, XIII and XXIV: | | Other pamphlets of the series. | |
|---|---|---|---|
| 1 Copy | $ .08 | 1 Copy | $ .04 |
| 5 Copies | .35 | 5 Copies | .15 |
| 10 Copies | .65 | 10 Copies | .25 |
| 25 Copies | 1.25 | 25 Copies | .50 |

**AMERICAN MEDICAL ASSOCIATION**
**535 North Dearborn Street - Chicago, Illinois**

## PAMPHLETS ON

# MEDICAL FAKES and FAKERS

**Alcola.**—Illustrated; 8 pages; price 4 cents.

**American College of Mechanotherapy.**—Illustrated; 8 pages; price 4 cents.

**Cancer Fakes.**—Illustrated; 48 pages; 6 cents.

**Carnegie University.**—Illustrated; 11 pages; price 4 cents.

**Consumption Cure Fakes.**—Illustrated; 138 pages; price 10 cents.

**Convictions Under the Food and Drugs Act.**—Illustrated; 55 pages; price 6 cents.

**Deafness Cure Fakes.**—Illustrated; 50 pages; price 10 cents.

**Duffy's Malt Whiskey.**—Illustrated; 18 pages; price 4 cents.

**"Female Weakness" Cures and Allied Frauds.**—Illustrated; 60 pages; 10 cents.

**Medical Institutes.**—Illustrated; 115 pages; price 10 cents.

**Medical Mail-Order Frauds.**—Illustrated; 84 pages; price 10 cents.

**Men's Specialists Frauds.**—Illustrated; 142 pages; price 10 cents.

**Mineral Waters.**—Illustrated; 12 pages; price 4 cents.

**Murine Eye Remedy.**—Illustrated; 7 pages; price 4 cents.

**Obesity Cure Fakes.**—Illustrated; 56 pages; price 10 cents.

**Oxydonor and Similar Fakes.**—Illustrated; 15 pages; price 4 cents.

**Press Agents and Preservatives.**—Illustrated; 7 pages; price 4 cents.

**Sanatogen.**—Illustrated; 32 pages; price 4 cents.

**Stuart's Plas-Tr-Pads and J. B. L. Cascade.**—Illustrated; 12 pages; price 4 cents.

**Van Bysterveld Medicine Company.**—Illustrated; 6 pages, price 4 cents.

**Woods' Cure for Drinking and Smoking.**—Illustrated; 10 pages; price 4 cents.

Write for a descriptive price list of these pamphlets and other publications dealing with frauds in medicine.

---

## AMERICAN MEDICAL ASSOCIATION

**535 NORTH DEARBORN STREET CHICAGO**


MSH 20252

END OF
TITLE